

CLAIMS

What is claimed is:

1 1. A method of manufacturing a plurality of MEMS
2 devices comprising:

3 aligning a plurality of MEMS dice formed on a
4 first substrate with a plurality of non-silicon caps
5 having at least one electrical via; and

6 bonding the plurality of MEMS dice with the
7 plurality of non-silicon caps to form a plurality of
8 MEMS devices, the plurality of MEMS devices having an
9 interior and an exterior, wherein the electrical via
10 extends from the interior to the exterior.

1 2. The method of claim 1, wherein the bonding of the
2 plurality of MEMS dice with the plurality of non-silicon
3 caps hermetically seals the plurality of MEMS devices.

1 3. The method of claim 2 further comprising:
2 dicing the plurality of MEMS devices.

1 4. The method of claim 3 further comprising:

2 bonding one of the plurality of MEMS devices to
3 an integrated circuit chip.

1 5. The method of claim 1, wherein the bonding of the
2 plurality of MEMS dice with the plurality of non-silicon
3 caps is achieved by a thermocompression bonding.

1 6. The method of claim 5, wherein the bonding of the
2 plurality of MEMS dice with the plurality of non-silicon
3 caps is achieved by a gold-to-gold thermocompression
4 bonding.

1 7. The method of claim 1, wherein the bonding of the
2 plurality of MEMS dice with the plurality of non-silicon
3 caps is achieved by solder bonding.

1 8. The method of claim 1, wherein the bonding of the
2 plurality of MEMS dice with the plurality of non-silicon
3 caps is achieved by eutectic bonding.

1 9. An apparatus comprising:
2 a plurality of MEMS dice formed on a substrate;
3 and

4 a plurality of caps bonded to the plurality of
5 MEMS dice, the plurality of caps having at least one
6 electrical via extending from a first side of the
7 plurality of caps to a second side of the plurality of
8 caps.

1 10. The apparatus of claim 9, wherein one of the
2 plurality of MEMS dice and one of the plurality of caps
3 forms a device interior and a device exterior, and the
4 electrical via extends from the device interior to the
5 device exterior.

1 11. The apparatus of claim 10, wherein the plurality
2 of caps comprises ceramic.

1 12. The apparatus of claim 11, wherein the plurality
2 of caps are formed on a common substrate.

1 13. The apparatus of claim 11, wherein the plurality
2 of caps are coupled to each other by a carrier.

1 14. The apparatus of Claim 10, wherein the electrical
2 via is coupled to a solder ball on the device exterior.

1 15. The apparatus of Claim 10, wherein the plurality
2 of caps comprises a zero-shrink ceramic.

1 16. A apparatus comprising:
2 a MEMS die formed on a semiconductor substrate;
3 and
4 a ceramic cap bonded to the MEMS die to form a
5 hermetically sealed interior, the ceramic cap having
6 at least one electrical via extending from a
7 hermetically sealed interior through the ceramic cap
8 to an exterior.

1 17. The apparatus of claim 16, wherein the at least
2 one electrical via is coupled to a solder ball on the
3 exterior.

1 18. The apparatus of claim 16 further comprising:
2 a circuit board, wherein the circuit board is
3 electrically coupled to the MEMS die by a solder ball
4 and the electrical via.

1 19. The apparatus of claim 16 further comprising:

2 an integrated circuit chip, wherein the
3 integrated circuit chip is electrically coupled to the
4 MEMS die by a solder ball and the electrical via.

1 20. The apparatus of claim 16, wherein the ceramic
2 cap is a zero-shrink ceramic.